Electronic Services - Los Angeles
M10279X

Bailey

SECTION
P99-7

PRODUCT INSTRUCTIONS

RESET BOOSTER RELAY
PART NO. 5319700-□

INDEX

	Parts
Operation	2
Routine Servicing	3
Corrective Maintenance	4
Calibration	6
Replacement Parts	7

The Reset Booster Relay is a pneumatic transmitting device which operates in conjunction with a nozzle-vane assembly to produce an output pressure which is proportional to a measured variable. The Booster Relay is always a component part of a measuring and transmitting instrument and is mounted integrally with that instrument.

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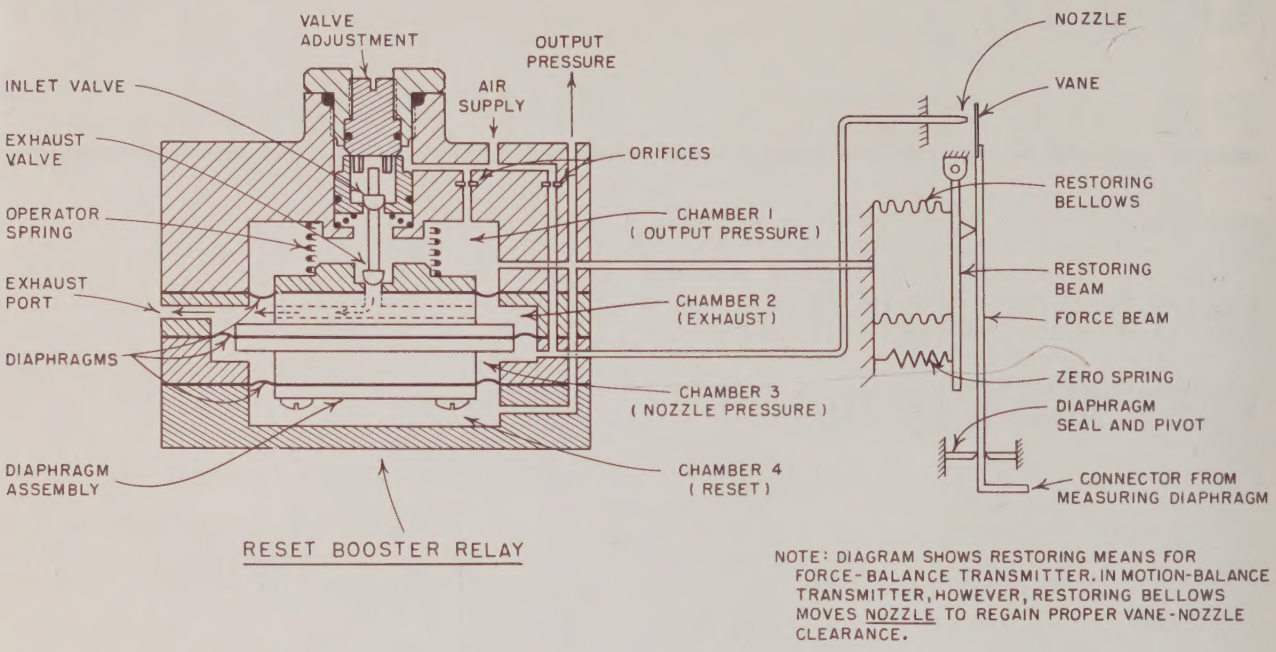

FIGURE 1 - Operating Diagram of Booster Relay in Force Balance Transmitter

OPERATION

A schematic operating diagram of the Reset Booster Relay is shown in Figure 1.

Three diaphragms divide the inside of the unit into four air pressure chambers. The diaphragms move together since they are clamped at their centers by the diaphragm assembly. Since chambers 1 and 4 are connected and are equal in effective diaphragm area, their opposing forces on the diaphragm assembly balance out. Chamber 2 is open to atmosphere. The operator spring exerts a force downward on the diaphragm assembly. Thus, since chamber 3 pressure exerts a force upward, the position of the diaphragm assembly is a direct function of chamber 3 pressure.

Supply air enters chamber 3 and the nozzle thru a pressure-reducing orifice. The rate of air flow from the nozzle determines the magnitude of the pressure in chamber 3. At balance, this pressure is about 2 psig, which is the pressure required to balance the downward force of the operator spring.

When the measured variable increases, linkage from the measuring element moves the vane closer to the nozzle tip, retarding the flow of air from the nozzle and increasing the pressure in chamber 3. The pressure increase moves the diaphragm assembly up, opening the inlet valve and closing the exhaust valve. Supply air enters chamber 1 thru the inlet valve, causing the output pressure of the Booster Relay to begin to increase.

Chamber 1 pressure is also applied to the restoring bellows. As the pressure increases, the restoring bellows extends, moving the vane away from the nozzle. The resultant increased rate of air flow from the nozzle causes the pressure in chamber 3 to begin to decrease.

Chamber 1 pressure will continue to increase until the vane is restored to that position with respect to the nozzle which produces a pressure of 2 psig in chamber 3. The operator spring by then has moved the diaphragm assembly down to its original position, closing the inlet valve and causing the Booster Relay output pressure to stabilize at the new, increased value.

When the measured variable decreases, the operation of the Booster Relay as described above is reversed. The vane moves away from the nozzle, decreasing the pressure in chamber 3 below 2 psig. The operator spring moves the diaphragm assembly down, opening the exhaust valve and permitting the output pressure to

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begin to decrease thru chamber 1. As the pressure in the restoring bellows decreases, the bellows and consequently, the restoring beam begin to retract. The force beam, following the restoring beam, moves the vane closer to the nozzle, increasing the pressure in chamber 3. Chamber 1 pressure will continue to decrease until the vane is restored to that position with respect to the nozzle which produces a pressure of 2 psig in chamber 3. The diaphragm assembly by then has been restored to its original position, with the inlet valve closed and Booster Relay output pressure stabilized at the new, decreased value.

Note that supply air also enters chamber 1 thru a pressure-reducing orifice. When the Relay is at balance, the bleed of air thru this orifice maintains the pressure in chamber 1 slightly above that value required to permit the diaphragm assembly to seat positively against the exhaust valve. The exhaust valve is thus maintained in a "floating" position to facilitate the instrument's speed of response to a change in input.

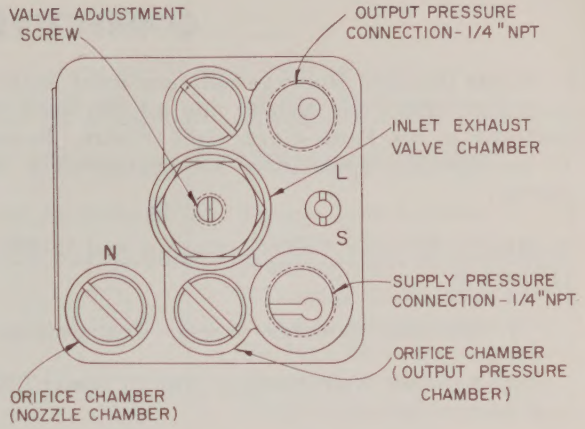


FIGURE 2 - Output and Supply Connections

ROUTINE SERVICING

1. Periodically inspect nozzle tip (Figure 3) and vane (on associated instrument) for deposits of oil, dirt, etc. Clean with a suitable solvent.

2. Periodically replace felt pad air filters as follows:

a. Turn OFF supply air to Booster Relay and disconnect supply air and output lines from Booster (Figure 2).

b. Remove wire mesh discs (Item 26, Figure 5) and felt pads (Item 27). This is most easily accomplished with a pick.

c. Replace felt pads. Replace wire mesh discs.

NOTE: When replacing mesh discs, make certain there is a disc under felt pad in supply connection

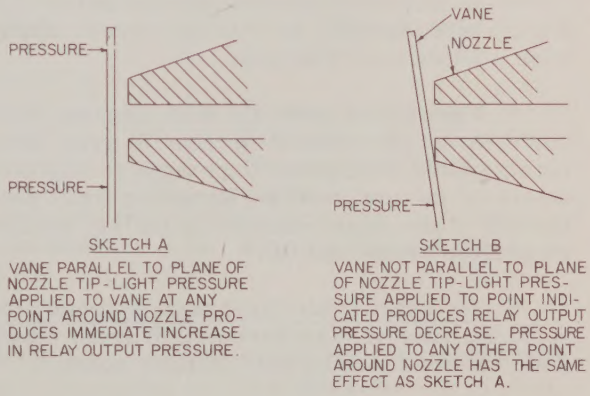

PRESSURE
PRESSURE
SKETCH A
VANE PARALLEL TO PLANE OF NOZZLE TIP - LIGHT PRESSURE APPLIED TO VANE AT ANY POINT AROUND NOZZLE PRODUCES IMMEDIATE INCREASE IN RELAY OUTPUT PRESSURE.
VANE
NOZZLE
PRESSURE
SKETCH B
VANE NOT PARALLEL TO PLANE OF NOZZLE TIP - LIGHT PRESSURE APPLIED TO POINT INDICATED PRODUCES RELAY OUTPUT PRESSURE DECREASE. PRESSURE APPLIED TO ANY OTHER POINT AROUND NOZZLE HAS THE SAME EFFECT AS SKETCH A.

FIGURE 3 - Vane and Nozzle Alignment

d. Reassemble supply air and output lines to Booster unit. Then turn ON supply air to Booster Relay.

CORRECTIVE MAINTENANCE

If the Booster Relay is not operating satisfactorily, make the checks and adjustments as outlined in the Fault Correction Chart. Refer to the specific subheading for replacement of parts.

Replacing Booster Unit Diaphragm and O-Ring (Figure 5)

1. Remove Booster from Transmitter.

2. Remove four screws (19) in cover (20) and remove cover.

3. Remove base (28) and spring (10).

4. To disassemble base (28):

a. Remove valve cap (14) and O-ring (22).

b. Turn base over and let upper valve seat (13) and upper seat spring (11) fall out of base.

c. Remove valve adjustment screw (12) from valve cap (14) by turning screw clockwise until threads disengage.

5. Hold clamp plate (5) with fingers. With other hand, pull exhaust section (3) away from clamp plate, permitting diaphragm to slip thru center of exhaust section. Remove nozzle section (2) in the same manner by pulling section away from lower seat (8).

6. To disassemble diaphragm assembly (5, 6, 7, 8), remove four screws (18) from clamp plate (5) and carefully pull sections apart.

7. Reassemble the unit in reverse order to disassemble, observing the precautions outlined below. Note that the four sections of the Relay (items 20, 2, 3, and 28 in Figure 5) have a projecting line on one face to serve as an alignment and reassembly guide.

8. Reassemble diaphragm assembly carefully to insure concentric alignment between diaphragms (17) and metal parts (5, 6, 7, 8). Apply Loctite Grade D (Loctite Corporation, Newington, Connecticut) cement to threads of four screws (18) before inserting in threaded holes. (Do not use sealing cement between diaphragms and metal parts.) Tighten screws evenly and gradually to a final torque of eight in-lb.

9. To reassemble nozzle section (2) and exhaust section (3), slip diaphragm (17) thru center hole of applicable section. Assemble so that indented sides of nozzle and exhaust sections face each other. Make sure that projecting lines on outside faces are aligned.

10. Assemble base (28), spring (10), and cover (20) to subassembly completed in steps 8 and 9. Press sections of Relay together firmly with hands. Make sure that projecting lines on all four sections are aligned.

11. With parts 9 and 11 thru 14 removed from base (28), observe alignment between seat (8) and hole in bottom of base (28). Exhaust valve seat in Item 8 should be centered under hole in base (28). If not, align parts as follows:

12. Remove base (28) and reposition diaphragm assembly (5, 6, 7, 8) slightly to obtain concentricity. (Separate Relay sections (20, 2, 3) slightly so that diaphragms are free to move when position of diaphragm assembly is changed.)

13. Reassemble base (28) and spring (10) to subassembly. Recheck alignment and reposition diaphragm assembly if necessary.

14. Press Relay sections (20, 2, 3, 28) together firmly. Make sure that projecting lines on all four sections are aligned. Insert four screws (19) thru sections, and tighten screws evenly and gradually to a full torque of 30 in-lb.

15. Reassemble spring (11), upper valve seat (13), and valve stem (9), in base (28). Replace valve adjustment screw (12) in valve cap (14), and reassemble valve cap (14) in base (28).

16. Recalibrate Booster Relay as outlined under "Calibration," page 6, before returning to service.

FAULT CORRECTION CHART

Booster Fault	Probable Cause	Corrective Action
1. Booster Relay output pressure does not immediately increase when flow of air from nozzle is blocked.	a. Clogged nozzle orifice.	a. Clean nozzle orifice.
	b. Leakage around sections of Booster casing.	b. Torque four screws (Figure 5) clamping sections together to 30 in-lb. If leakage continues, replace all diaphragms and O-rings as outlined under "Replacing Booster Relay Diaphragm and O-rings".
	c. Dirty filters.	c. Remove and replace filters as outlined under "Routine Servicing", page 3.
	d. Booster adjustment incorrect.	d. Check Booster adjustment (see page 6).
2. Booster output sluggish or output increases then drops to zero when flow of air from nozzle is blocked.	a. Leakage present between chambers 2 and 3 (Figure 5).	a. Replace all diaphragms and O-rings as outlined under "Replacing Booster Relay Diaphragm and O-rings".
	b. Dirty filters.	b. Remove and replace filters as outlined under "Routine Servicing", page 3.
3. Booster Relay output pressure does not immediately decrease when vane is pulled away from nozzle.	a. Blocked air line from Booster Relay to nozzle.	a. Remove line and clean.
	b. Booster adjustment incorrect.	b. Check Booster adjustment (see page 6).
	c. Internal leakage between chambers 3 and 4 (Figure 5). Output pressure remains at value of supply pressure.	c. Replace all diaphragms and O-rings as outlined under "Replacing Booster Relay Diaphragms and O-rings".

CALIBRATION

The Reset Booster Relay has only one adjustment. The valve adjustment, shown in Figures 1 and 2, adjusts the inlet valve seat to balance the effective areas of the chamber 1 and chamber 4 diaphragms to obtain an even reset rate. This adjustment is sealed with a drop of Loctite cement (Grade C) after factory calibration. Do not change the setting of this adjustment unless absolutely necessary. If the Relay has been disassembled, or if the setting of the valve adjustment has been changed for any reason, check the calibration of the unit as outlined below.

1. Remove Booster Relay from transmitter.

2. Attach calibration block, Pt.No.5320549-1, to Relay using screws removed in step 1, and connect in calibration setup as shown in Figure 4. Connect mercury manometer to Booster Relay output pressure connection (marked L on Relay). Connect another mercury manometer to tee fitting in piping to input connection of calibration block. Calibration block, Pt. No. 5320549-1, may be purchased from Bailey Meter Company.

3. Apply supply pressure of 18 psi (for 3-15 psig output range) or 30 psi (for 3-27 psig output range) to Booster Relay supply pressure connection (marked "S" on Relay).

4. Slowly apply about 2 psi to calibration block input connection to simulate nozzle back pressure. Note value of pressure, on nozzle back pressure manometer, which causes output pressure to increase at a constant rate to 15 psi or 27 psi. Slowly reduce nozzle back pressure and note pressure which causes output pressure to decrease at a constant rate to zero psi.

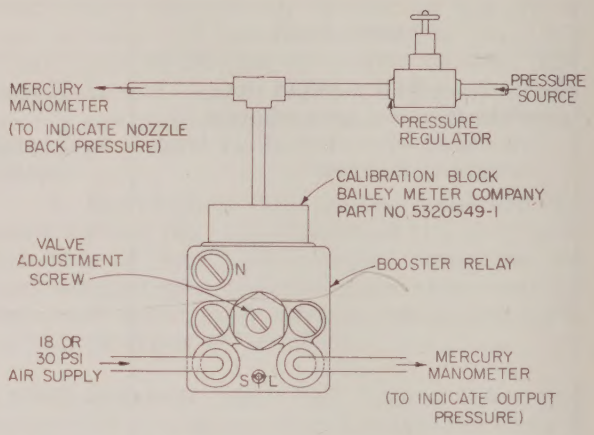


FIGURE 4 - Calibration Setup

a. If rate of output pressure rise slows down (decelerates) turn valve adjustment screw clockwise a small amount.

b. If rate of output pressure rise speeds up (accelerates) turn adjustment screw counterclockwise a small amount.

5. Repeat step 4 above until output pressure changes at a constant rate. The difference between the nozzle back pressure which causes a constant rise and that which causes a constant drop should be about 0.1 psi and should occur between 1.6 psi and 2.5 psi.

6. If Booster Relay cannot be calibrated as described above, fault may be caused by leakage. Refer to "Corrective Maintenance," to check Booster Relay for leakage.

REPLACEMENT PARTS

Spare Parts Kit

The Spare Parts Kit shown in Figure 5 should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit.

Ordering Individual Parts

Figure 5 is a Parts Drawing for the Reset Booster Relay, Part No. 5319700-□. This drawing will normally apply to the unit furnished. However, there may be individual differences in specific assemblies because of:

a. Design changes made since the printing of this Instruction Section, or

b. Special design of equipment furnished to make it suitable for a special application.

Therefore, when ordering parts, assure receipt of correct replacements by specifying on the order:

1. The complete part number (stamped on instrument nameplate) and code label number of instrument for which parts are desired.

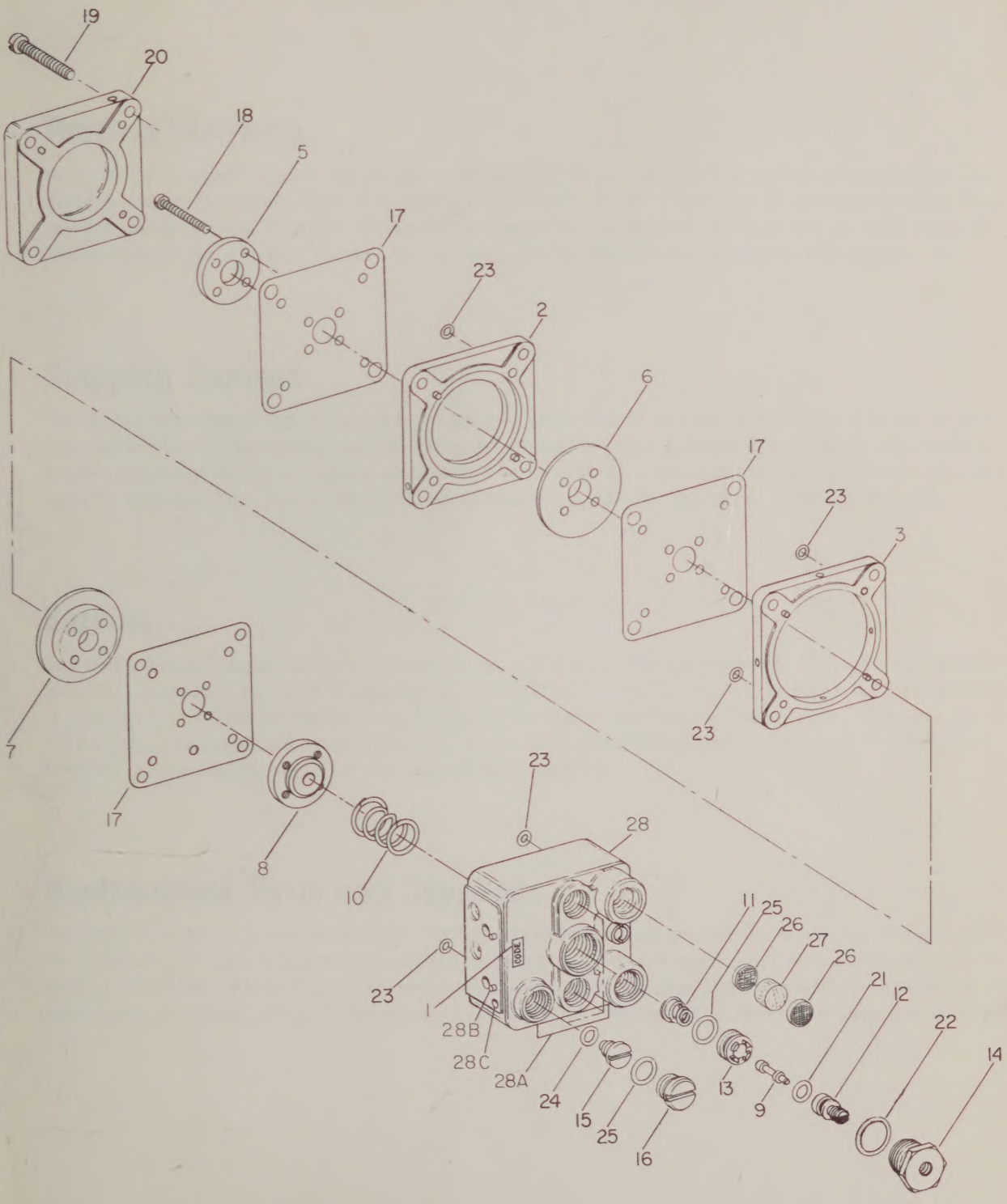
2. The Parts Drawing on which each part is illustrated. (The Parts Drawing Number is given in the Figure caption.)

ITEM	PART NO.	NAME
1	CODE LABEL	SPECIFY NUMBER ON LABEL WHEN ORDERING PARTS
2	5319691-1	NOZZLE SECTION
3	5324275-1	EXHAUST SECTION
5	5319703-1	CLAMP PLATE
6	5319701-1	DIAPHRAGM CLAMP
7	5319702-1	EXHAUST CLAMP PLATE
8	5319699-1	LOWER SEAT
9	5319696-1	VALVE STEM
10	5320156-1	LOWER SEAT SPRING
11	5319705-1	UPPER SEAT SPRING
12	5316808-1	VALVE ADJ SCREW
13	5319698-1	UPPER VALVE SEAT
14	5316809-1	VALVE CAP
15	5316464-1	ORIFICE ASSY, 2 REQD
16	5318872-1	SEALING CAP, 3 REQD
17	5319704-1	DIAPHRAGM, 3 REQD
18	4-40 x 3/4	SLOT. BINDING HEAD SCREW, 4 REQD
19	10-32 x 1-1/8	FIL HD SST SCR, 4 REQD
20	5319690-1	COVER
21	5311428-20	O-RING
22	5311428-7	O-RING
23	5311428-10	O-RING, 5 REQD
24	5311428-2	O-RING, 2 REQD
25	5311428-11	O-RING, 4 REQD
26	5320413-1	WIRE MESH DISC, 4 REQD
27	5320414-1	FELT PAD, 2 REQD
28	SEE TABLE	BASE ASSY, INCLUDES:
28A	5316818-2	PLUG, 2 REQD
28B	3/32 x 1/4	CD PL STL TYPE 4 GROOV PIN, SEE TABLE
28C	5316818-1	PLUG, SEE TABLE

RESET BOOSTER RELAY	RELAY COLOR	ITEM 28	ITEM 28B	ITEM 28C
5319700-1	PEARLESK GRAY	5319689-1	2 REQD	1 REQD
5319700-2	WHITE	5319689-2	OMIT	OMIT
5319700-3	PEARLESK GRAY	5319689-2	OMIT	OMIT
5319700-4	PEARLESK GRAY	5319689-3	2 REQD	OMIT

SPARE PARTS KIT PT. NO. 256011-1			
ITEM NO.	QUANTITY	ITEM NO.	QUANTITY
9	1	23	5
10	1	24	2
11	1	25	3
17	3	26	4
21	1	27	2
22	1		

FIGURE 5 - Parts Drawing P99-117



Reset Booster Relay Assembly, Pt. No. 5319700-□

Product Warranty

Bailey Meter Company warrants the products manufactured by it to be free from defects in material and workmanship and will repair or replace, at its option, free of charge, f.o.b. its factory, such part or parts which prove defective within one year from date of shipment. In respect to any products which are not an integral part of a product manufactured by the Company, the warranty given by the manufacturer thereof shall apply.

Shipping Damage

We strongly recommend that you inspect and test your instrument as soon as you receive it. If the instrument is damaged or operates improperly, notify the carrier for inspection of the shipment. The carrier's claim agent will prepare a report of damage, a copy of which should be forwarded to your nearest Bailey District Office (see back cover for location). The District Office will then tell you how to have the instrument repaired or replaced.

Service

The Bailey Meter Company is vitally concerned that your Bailey instrument provides continued, fine performance. This instruction manual is designed to fully describe the correct installation, operation, and maintenance of your instrument under recommended conditions. If the need arises, factory-trained Service Engineers are on call for prompt, in-plant maintenance. Telephone or wire your nearby Bailey District Office to make arrangements for this service (see back cover for location and telephone number).

Replacement Parts and Supplies

Complete parts drawings and recommended spare parts kit information are included in this instruction manual. When replacement parts or supplies are required for maintenance of your Bailey instrument, contact your nearest Bailey District Office (see back cover for location). Always specify complete data on the instrument nameplate on your inquiry or order for parts. Common parts are available for shipment within 48 hours on a speed-order basis.

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